

WHAT IS CLAIMED IS:

1 1. A method for matching a published event with one or more
2 subscribers in a content-based publish-subscribe system in a computer
3 network, each subscriber having one or more predetermined predicates, the
4 method comprising:

5 creating a virtual Direct Acyclic Graph (DAG) including one or more
6 arbitrary boolean tests representing the predetermined predicates;

7 eliminating, upon publishing the event, one or more subscribers, at
8 least one of whose predicates is not satisfied while the DAG is traversed;
9 and

10 identifying at least one matching subscriber if all the predicates of the
11 matching subscriber are satisfied,

12 wherein the DAG has a root node, one or more leaf nodes representing
13 subscribers, and one or more non-leaf nodes representing the boolean tests
14 which are formed by boolean connectors.

1 2. The method of claim 1 wherein the step of creating further
2 includes constructing the DAG in a top-down fashion so that common
3 predicates shared by the subscribers are examined first and a minimal
4 number of boolean tests are conducted to identify the matching subscribers.

1 3. The method of claim 2 further comprising adding new
2 predicates of a new subscriber to the DAG recursively starting from the root
3 node, and adding a leaf node at any node in the DAG where the boolean
4 test at the node is satisfied.

1 4. The method of claim 1 wherein each non-leaf node directs
2 toward other leaf nodes or non-leaf nodes based on the results of the boolean
3 test at the non-leaf node.

1 5. The method of claim 4 wherein the boolean test result is one of
2 TRUE, FALSE, or NULL.

1 6. The method of claim 1 wherein the boolean connectors are
2 AND, OR, NOT and parenthesis.

1 7. The method of claim 1 wherein the predetermined predicate
2 includes an atomic test, a disjunction of sub predicates, a conjunction of sub
3 predicates, or a negation of a sub predicates.

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1 8. A computer program for matching a published event with one
2 or more subscribers in a content-based publish-subscribe system in a
3 computer network, each subscriber having one or more predetermined
4 predicates, the program comprising instructions for:

5 creating in a top-down fashion a virtual Direct Acyclic Graph (DAG)
6 including one or more arbitrary boolean tests representing the
7 predetermined predicates so that common predicates shared by the
8 subscribers are examined first and a minimum number of boolean tests are
9 thus conducted to identify the matching subscriber;

10 eliminating, upon publishing the event, one or more subscribers
11 wherein at least one of whose predicates is not satisfied while the DAG is
12 traversed; and

13 identifying at least one matching subscriber if all the predicates of the
14 matching subscriber are satisfied,

15 wherein the DAG has a root node, one or more leaf nodes representing
16 subscribers, and one or more non-leaf nodes representing the boolean tests
17 formed by boolean connectors.

1 9. The program of claim 8 wherein the instructions for creating
2 further includes, when a new subscriber is added, adding the new predicates
3 of the new subscriber to the DAG recursively starting from the root node,
4 and adding a leaf node at any node in the DAG where the boolean test at
5 the node is satisfied.

1 10. The program of claim 8 wherein each non-leaf node directs
2 toward other leaf nodes or non-leaf nodes based on the test result at the non-
3 leaf node.

